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# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 4024-4043PC	<b>FOR FURTHER ACTION</b>		See item 4 below
International application No. PCT/US2004/034603	International filing date ( <i>day/month/year</i> ) 18 October 2004 (18.10.2004)	Priority date ( <i>day/month/year</i> ) 29 October 2003 (29.10.2003)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant XANOPTIX INC.			

- This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).
- This REPORT consists of a total of 8 sheets, including this cover sheet.  
  
In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.
- This report contains indications relating to the following items:
 

<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input type="checkbox"/> Box No. II	Priority
<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI	Certain documents cited
<input checked="" type="checkbox"/> Box No. VII	Certain defects in the international application
<input checked="" type="checkbox"/> Box No. VIII	Certain observations on the international application
- The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. +41 22 338 82 70	Date of issuance of this report 01 November 2006 (01.11.2006)
	Authorized officer  Beate Giffo-Schmitt  e-mail: pt03@wipo.int

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:  
RICHARD STRAUSSMAN  
MORGAN & FINNEGAN, LLP  
THREE WORLD FINANCIAL CENTER  
NEW YORK, NY 10281-2101

# PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference 4024-4043PC		Date of mailing (day/month/year) <b>06 OCT 2006</b>
International application No. PCT/US04/34603		International filing date (day/month/year) 18 October 2004 (18.10.2004)
International Patent Classification (IPC) or both national classification and IPC IPC: H01S 5/00( 2006.01), 3/08( 2006.01); H01L 21/00( 2006.01) USPC: 372/43.01, 44.01, 45.01, 46.01, 50.1, 96, 97, 98; 438/22		Priority date (day/month/year) 29 October 2003 (29.10.2003)
Applicant XANOPTIX INC.		

1. This opinion contains indications relating to the following items:

- ☒ Box No. I      Basis of the opinion
- ☐ Box No. II      Priority
- ☐ Box No. III      Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV      Lack of unity of invention
- ☒ Box No. V      Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI      Certain documents cited
- ☒ Box No. VII      Certain defects in the international application
- ☒ Box No. VIII      Certain observations on the international application

## 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Date of completion of this opinion 11 August 2006 (11.08.2006)	Authorized officer Minsun O Harvey Telephone No. 571-272-1835
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WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US04/34603

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed  
☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing  
☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper  
☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed.  
☐ filed together with the international application in electronic form.  
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.  
PCT/US04/34603

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims NONE YES

Claims 1-32 NO

Inventive step (IS)

Claims 5, 9, and 32 YES

Claims 1-4, 6-8 and 10-31 NO

Industrial applicability (IA)

Claims 1-32 YES

Claims NONE NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US04/34603

**Box No. VII Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

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INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US04/34603

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the questions whether the claims are fully supported by the description, are made:

The drawings are objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 7 because: reference number 1910 has been used to designate both active region and Schottky contact in Figure 19.

The description is objected to as containing the following defect(s) under PCT Rule 66.2(a)(iii) in the form or contents thereof: The specification recites "Schottkey", for example on page 3, line 25, page 4, which should be replaced by -Schottky-- throughout the specification.

Claims 1, 5, 20, 25 and 29-30 are objected to under PCT Rule 66.2(a)(iii) as containing the following defect(s) in the form or contents thereof: The claims recite "Schottkey" which should be replaced by --Schottky-- as well.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.  
PCT/US04/34603

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1-4, 6-7, 10-12, 14-15, 20-28 are lack of an inventive step under PCT Article 33(3) as being obvious over Aronson et al. ('862) in view of Tran et al. ('555).

With respect to claims 1 and 25, Aronson discloses in Fig. 3 a laser-based device comprising a VCSEL-type laser having an active side 220 and a passive side 210 opposite the active side; and a photodetector unit 210, the photodetector unit comprising an absorbing region 211, and a Schottky contact 212 having a first portion abutting the absorbing region except for the photodetector with absorbing layer being on the passive side. However, Aronson further suggests that the photodetector could be located either above or below the laser structure (col. 12, lines 39-43). Tran discloses in Fig. 6 a laser-based device comprising a VCSEL laser and a photodetector unit 74 disposed on the passive side of the device. For improvement of the device, it would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide the photodetector on the passive side of the laser-based device in order to measure the photon leakage from the laser as suggested by Tran (paragraph 0026). It is noted that Aronson discloses the transparent layer (211) could partially absorb light (col. 8, ln 48-49).

With respect to claims 2-3, Tran discloses a substrate 64 abutting the active side and comprising an access way 66 lower at least a portion of the active side so that when the laser emits light through the active side, the emission will pass through the access way.

With respect to claim 4, it would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide an absorbing layer comprising a substrate (64) in the photodetector layer which is disposed on the emitting side of the laser as suggested by Tran.

With respect to claims 6-7, both lasers from Tran and Aronson are top or bottom emitting lasers. It is noted that the laser device can be placed one way or the other so that light can be emitted as desired.

With respect to claims 10-11 and 27-28, Aronson discloses in active side comprising an active side mirror 104/204/304 for being p-type. However, Aronson also teaches p-type could be replaced with n-type (col. 11, lines 7-11) and the mirror consists AlGaAs.

With respect to claims 12 and 26, Aronson discloses the absorbing region being ITO which is also sometimes considered as semi-insulative material.

With respect to claims 14-15, Aronson discloses the thickness of layer 115 being at least 1000 Angstroms which is at less than 2 microns and equal 2 microns (col. 8, lines 25-44).

With respect to claims 20-24, Aronson discloses the product as cited in the rejection of claim 1, and further discloses the

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.  
PCT/US04/34603

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

method of using the same product which includes measuring the photons leaked out of the laser and converted to electrical current and feed the electronic circuit to perform a compensation action based on the measured value from the photodetector (col. 1, lines 15-3 and col. 4, lines 13-30). These processes would inherently include determining the output power amount and adjusting a bias current for the laser as well as modulation current.

Claims 8 and 29-31 are lack of an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of Lee ('152). Aronson and Tran disclose the claimed invention except for an electronic circuit chip hybridized to the laser. Lee discloses a hybrid pickup device including photodetector, laser diode, and electronic circuit all together as seen in Fig. 4-5 and 7. It would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide hybridized components as taught by Lee in order to reduce the electrical connection distance.

Claim 13 is lack of an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of Jayaraman ('976). Aronson discloses the claimed invention except for teaching the absorption layer comprising Gallium Arsenide. Jayaraman discloses a monolithically integrated device with VCSEL and pin detector in Fig. 2 and 7 wherein the photodetector 16 being positioned in the bottom of the VCSEL to measure the leakage photons of the VCSEL. The photodetector 16 is disposed beneath an absorption layer 43 which comprises Gallium Arsenide. It would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide the absorption layer comprised Gallium Arsenide as taught by Jayaraman because it is well known in the art to use such material for absorption layer.

Claims 16-19 are lack of an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of Morgan ('401). Aronson and Tran disclose the claimed invention except for explicitly teaching the mirror, especially on the active side, comprising at least one of a carbon, berrilium, or zinc dopant and including AlGaAs. Morgan discloses an integrated device including both VCSEL and a photodiode in Fig. 4 with the top mirror 146 being doped with zinc and includes AlGaAs. It would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide zinc doped top mirror because it is well known in the art to used AlGaAs with zinc as dopant. It has been obvious to one skilled in the art to use silicon as dopant for bottom mirror.



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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/34603

## A. CLASSIFICATION OF SUBJECT MATTER

IPC: H01S 5/00( 2006.01),3/08( 2006.01);H01L 21/00( 2006.01)

USPC: 372/43.01,44.01,45.01,46.01,50.1,98;438/22

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 372/43.01,44.01,45.01,46.01,50.1,96-98; 438/22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6483862 B1 (ARONSON et al) 19 November 2002 (19.11.2002), column 10, lines 56-67 to column 11, lines 1-20.	1-3, 6-8,10-31
---		5, 9, 32
A		
Y	US 2003/00025555 A1 (TRAN et al) 2 January 2003 (2.1.2003), paragraph 0026	1-3, 6-7, 10-12, 14-15, 20-28
Y	US 5,136,152 (LEE) 4 August 1992 (4.8.1992), Figures 4-5 and 7.	8, 29-31
Y	US 5,914,976 A (JAYARAMAN et al) 22 June 1999 (22.6.1999), Figures 2 and 7	13
Y	US 5,978,401 A (MORGAN) 2 November 1999 (2.11.1999), Figure 4	16-19

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

10 August 2006 (10.08.2006)

Date of mailing of the international search report

06 OCT 2006

Name and mailing address of the ISA/US

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